



Centennial District

TROLLEY SERVICE CONCEPT EVALUATION

DELAWARE VALLEY
 **dvrpc**
REGIONAL
PLANNING COMMISSION

OCTOBER 2019



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Project Background

The *Centennial District Trolley Service Concept Evaluation* explores the feasibility of providing trolley service to the Centennial District of Fairmount Park in conjunction with SEPTA's Trolley Modernization program.

The Centennial District is home to several recreational and tourism destinations and is adjacent to the East and West Parkside communities. Over the last decade, several planning studies have recommended improving access to the district via public transit, in some cases, recommending new light rail service.

SEPTA is in the planning phase of its Trolley Modernization program, a multi-year effort to replace its entire fleet of trolleys with state-of-the-art light rail vehicles. More than a one-for-one vehicle replacement, Trolley Modernization requires SEPTA to comply with the Americans with Disabilities Act (ADA) by building accessible station platforms wherever modern trolleys stop. This massive investment is prompting SEPTA to evaluate the future of the trolley system, which includes reviewing several of the most frequently suggested system expansion proposals.

As part of this evaluation, DVRPC was asked to help SEPTA understand whether expanding trolley service to the Centennial District is feasible for SEPTA as part of Trolley Modernization. The DVRPC project team used several methods to evaluate the feasibility of a Centennial District trolley, including:

- > Ridership forecasts for two proposed trolley service patterns,
- > Capital cost estimates for modern trolley infrastructure,
- > An evaluation of peer practices for recreational and tourism-focused public transit, and
- > A review of SEPTA's upcoming bus network reevaluation.

A steering committee made up of representatives from the following organizations guided the DVRPC team throughout this project:

- > City of Philadelphia
 - + Office of Transportation, Infrastructure, and Sustainability (oTIS)
 - + Philadelphia Parks & Recreation (PPR)
 - + Streets Department
 - + Philadelphia City Planning Commission (PCPC)
- > Southeastern Pennsylvania Transportation Authority
- > Fairmount Park Conservancy
- > Independence Visitor Center

Centennial District Trolley Service Concept Evaluation



Figure 1: DVRPC Region



Figure 2: Philadelphia



Figure 3: Study Area

Centennial District

Trolley Service Concept Evaluation

Project Background

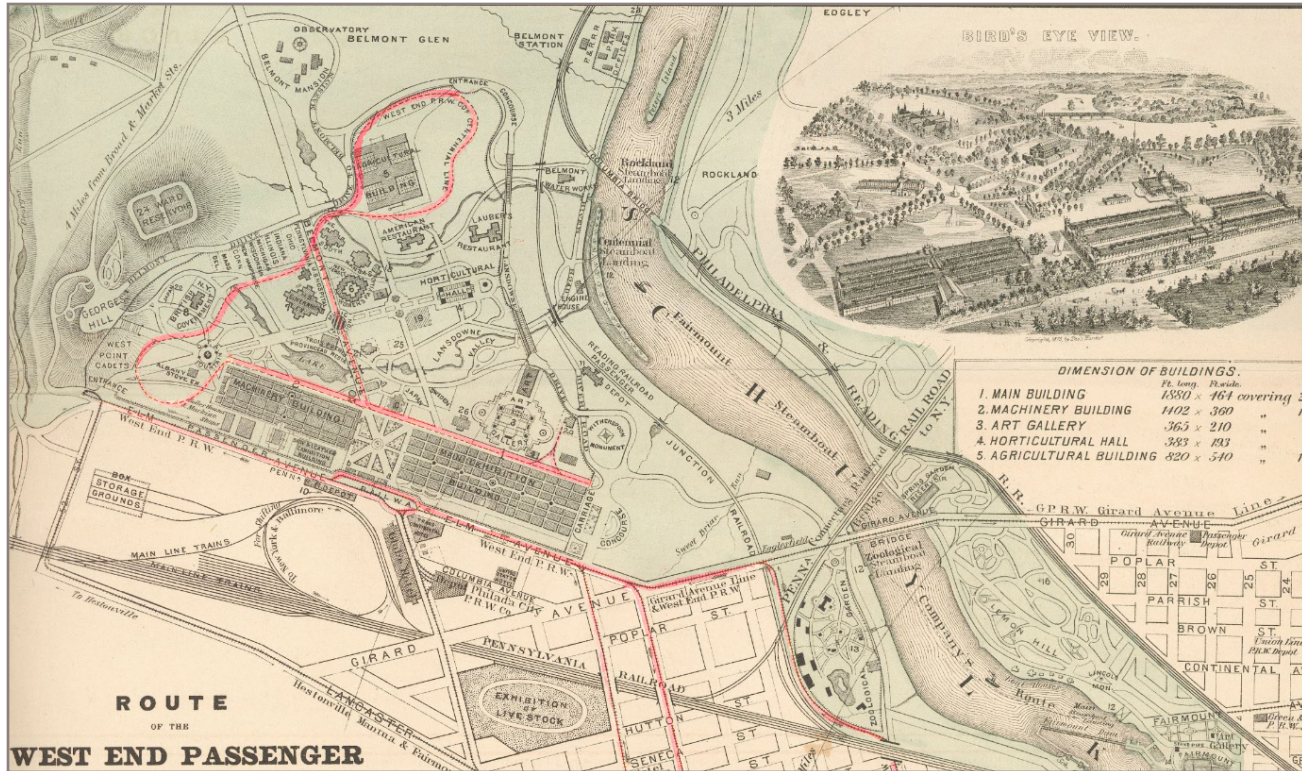


Figure 4: Map of the Centennial Grounds and Vicinity, Philadelphia, Showing the Approaches by Steam and Street Railways (detail)

Source: Centennial Exhibition 1876 Philadelphia Scrapbook. Retrieved from <https://libwww.freelibrary.org/digital/item/2398>

History

In 1876, Philadelphia hosted the Centennial International Exhibition, the first World's Fair held in the United States. The event, timed to celebrate the nation's hundredth anniversary, showcased arts, industry, and culture from around the world, drawing more than 10 million visitors over six months. Philadelphia City Council offered what we know today as the Centennial District as fairgrounds.

Hundreds of new buildings were constructed to house the exhibitions, most of which were razed at the fair's end.

Visitors to the Exhibition arrived by train at a station constructed at what is today the corner of Parkside and Belmont Avenues. From there, new trolley lines offered internal circulation within the fairgrounds and to or from the surrounding neighborhood (see Figure 4, trolley lines highlighted in red).

After the Centennial Exhibition, the area reverted to parkland. The few fair buildings that remained became recreational and tourism destinations, including Memorial Hall, the current home of the Please Touch Museum, and Horticultural Hall, the eventual site of today's Horticulture Center.

The Centennial District is occasionally mentioned as a potential site for a similar exhibition, such as the semiquincentennial in 2026.

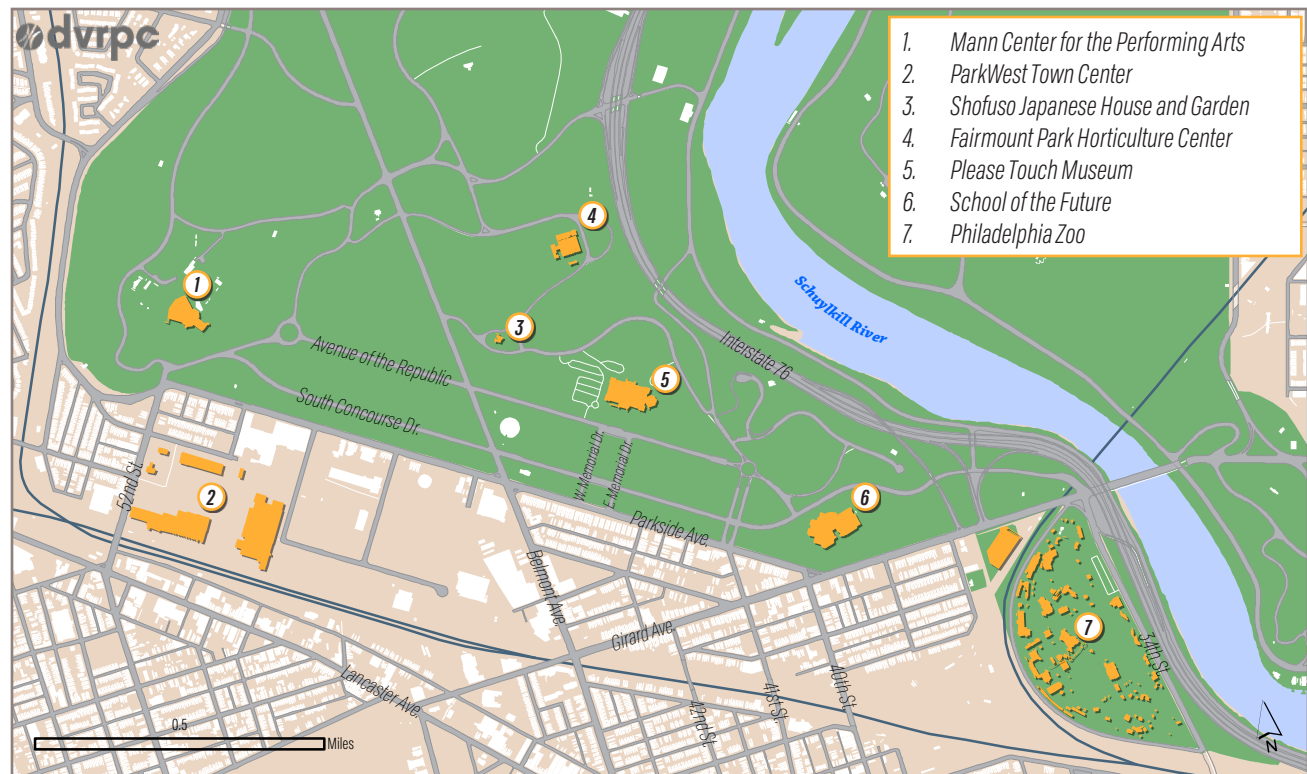


Figure 5: Centennial District attractions

The Centennial District Today

The Centennial District remains a cultural destination but is also home to communities and institutions that have grown nearby since the Centennial Exhibition. The most visited cultural attractions in the district include the Philadelphia Zoo (more than 1.2 million annual visitors),¹ the Please Touch Museum (PTM) (about 500,000 annual visitors),² and the Mann Center for the Performing Arts (more than 200,000 annual visitors.)³

1 "About the Zoo," Philadelphia Zoo, last updated February 21, 2017, www.philadelphiazoo.org/About-the-Zoo.aspx.

2 Please Touch Museum, *Annual Report*, 2017.

3 "About the Mann," Mann Center for the Performing Arts, last updated November 16, 2018, www.manncenter.org/about.

The district's cultural institutions often attract visitors outside of traditional commute times. Concerts at the Mann Center typically begin at 7:00 PM. The Zoo reports that about half of their weekly attendance occurs on weekends, and nearly 70 percent of their annual attendance occurs between April and August.⁴ These hours of operation are one reason it is challenging for SEPTA to serve Centennial District destinations.

The Centennial District is also adjacent to the East and West

4 DVRPC, *Philadelphia Zoo Passenger Rail*, 2017.

Parkside neighborhoods, home to approximately 5,300 residents.⁵

Local institutions draw visitors, but typically not tourists. The School of the Future high school, sees most of its travel activity around its 7:30 AM opening and its 2:34 PM dismissal. The ParkWest Town Center features a supermarket and a big-box-style hardware store, among other businesses. Typically, the shopping center's businesses are open between approximately 6:00 AM and 11:00 PM.

5 U.S. Census Bureau, *2013-2017 American Community Survey 5-Year Estimates*.

Previous Studies

This study builds on numerous planning studies that have addressed transportation issues in the Centennial District.



Figure 6: Centennial District Master Plan
Source: Fairmount Park Conservancy, 2005

The *Centennial District Master Plan* (2005) was completed by MGA Partners for the Fairmount Park Conservancy and presented ambitious recommendations to improve the district and connect it to Center City.

Notable highlights include public realm improvements along Parkside Avenue (recently implemented with the Centennial Commons: Parkside Edge project), and consolidating Avenue of the Republic and South Concourse Drive into a single, safer roadway. This plan was also the first recent study to call for a new light rail line between the Centennial District and Center City.



Figure 7: Taming Traffic
Source: DVRPC, 2007

Taming Traffic (2007) was a series of projects that focused on roads around the DVRPC region and looked to recommend improvements using a context-sensitive approach. The report included a study of Parkside Avenue from 40th Street to 52nd Street. For transit riders, there were two main recommendations. The first was to improve transit stops so that they were highly visible, attractive, and included maps and information. The second was to improve conditions for pedestrians by slowing speeding and providing more crossings. These strategies would address the issues that make taking transit to the area institutions and the park itself unattractive.



Figure 8: West Park District Plan
Source: Philadelphia City Planning Commission, 2012

The *West Park District Plan* (2012) is a component of *Philadelphia2035*, Philadelphia's comprehensive plan, focused on an area that includes the Centennial District. The plan identified a need to strengthen public transit connections to the district's cultural and recreational assets, making three main recommendations towards this end:

- > Prioritize better service for the Route 10 and 15 trolleys throughout the district through the City of Philadelphia and SEPTA's cooperative Transit First Initiative. The plan specifically mentions stop consolidation and transit signal prioritization (TSP) as recommended improvements. Stop consolidation and TSP are incorporated as necessary strategies for implementing Trolley Modernization and have become an assumption of this project.
- > Devote further study to a direct light rail connection between Center City and cultural destinations in the Centennial District. The district plan calls for considering both tourist and commuter ridership. DVRPC partially addressed this recommendation in 2015 with the City Branch Transit Feasibility Study, focusing on an infrastructure asset in Center City that could be useful for a transit connection to the Centennial District in the future. This study further addresses this recommendation by investigating whether this light rail connection makes sense in the context of Trolley Modernization.
- > Dedicate long-term funding for PHLASH service. PHLASH received dedicated public funding through the most recent state transportation law, Act 89 of 2013.

The *Centennial Commons* project (2013) is a phased set of improvements for West Fairmount Park with a goal of better access and more amenities for residents of park-adjacent communities and visitors to park attractions.

Phase I, “Parkside Edge,” focuses on the park areas fronting Parkside Avenue and creating a neighborhood park within the park that includes construction of seating and swings to invite neighbors to visit and linger, as well as the addition of rain gardens. Phase I officially opened in June 2018. Phase II, “Youth Area,” encompasses a play space for children and families adjacent to the Kelly Pool, just east of the Please Touch Museum and is slated to break ground in the spring of 2020.

The *New Fairmount Park* plan (2014) was the result of a year-long process investigating how to revitalize East and West Fairmount Park, with a particular emphasis on park users and residents of adjacent neighborhoods. Pertinent to this project, the plan’s transportation recommendations focus on active transportation options to bring several user groups to the park, including neighbors, park employees, regional visitors, and tourists. The plan recommends improving transit shelters and stops and ensuring that stop placement aligns with trail connections, park entrances, and institutions. Other preliminary recommendations regarding transit included exploring ways to brand existing SEPTA routes that provide access to the park and expanding hours and increasing frequencies of services, especially during special events.

The *Philadelphia Bus Network Choices Report*, written by Jarrett Walker + Associates for SEPTA in 2018, is not specifically about the Centennial District, but is relevant when examining the District’s transit network. The *Choices Report* examines SEPTA’s existing citywide bus network, and recommends strategies to revise the network in a way that would provide better service to more people.

The *Choices Report*’s strategies include reducing duplicative service, simplifying the bus network, and encouraging riders to transfer between high-frequency routes. The report helped the project team understand both the shortcomings of existing bus service in the Centennial District, and SEPTA’s goals in reenvisioning the network.

In total, these studies offer a wide range of recommendations on bringing visitors to the Centennial District. Bolder visions for public transit in the district, exemplified in the *Centennial District Master Plan*, have proven difficult to realize, while plans with more granular recommendations, such as the *Centennial Commons* project, have experienced quick success. This study investigates the potential links between a large-scale project, Trolley Modernization, and the finely detailed transportation needs of the Centennial District. Specifically, we investigate whether trolley service to the Centennial District is feasible for SEPTA and other stakeholders to invest in as part of Trolley Modernization.



Figure 9: Centennial Commons
Source: Fairmount Park Conservancy, 2013



Figure 10: The New Fairmount Park
Source: Philadelphia Parks and Recreation, Fairmount Park Conservancy, Penn Praxis, 2014

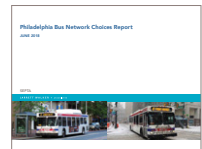


Figure 11: Philadelphia Bus Network Choices Report
Source: SEPTA, 2018

Centennial District

Trolley Service Concept Evaluation

Existing Conditions

Centennial District Trolley Service Concept Evaluation

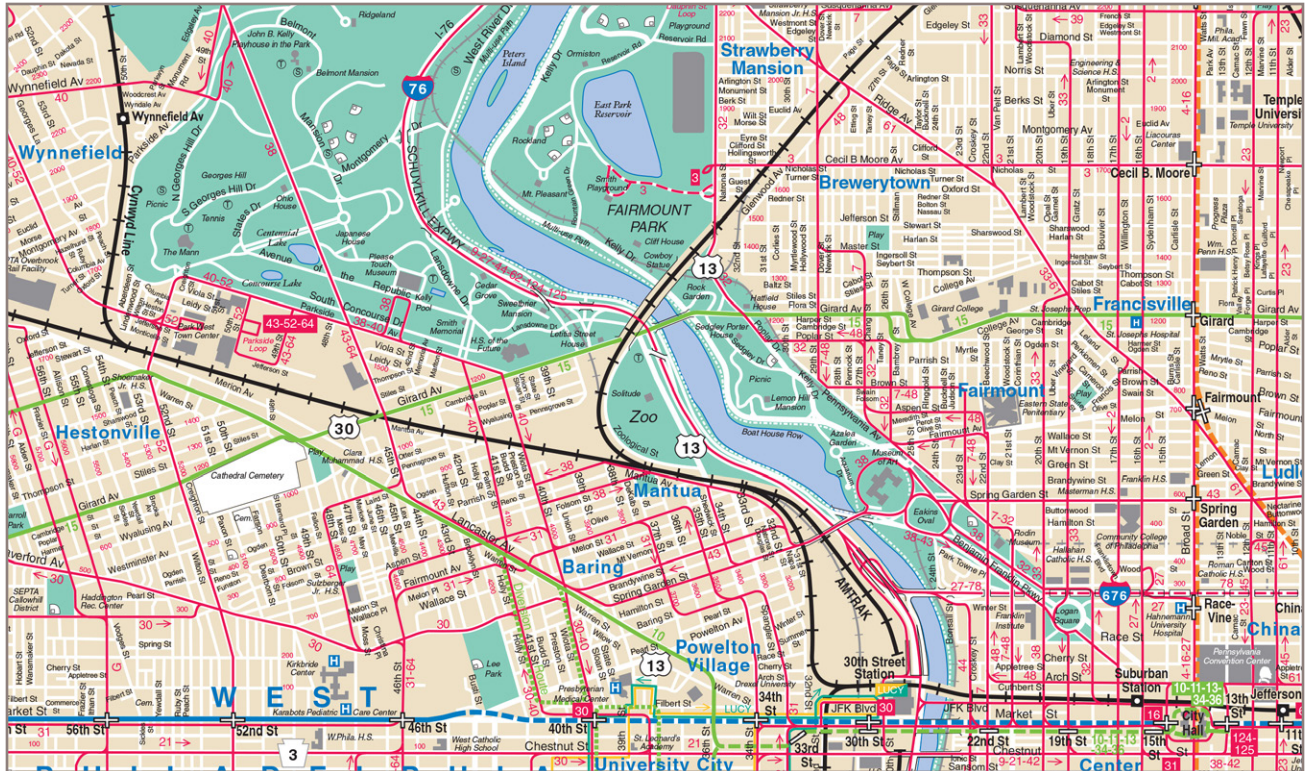


Figure 12: SEPTA Official Philadelphia Transit & Street Map (detail)

Source: SEPTA, 2018

Public Transit Context

The Centennial District study area enjoys robust public transportation service, including several bus routes, two trolley routes, Regional Rail, and shuttle service, all within a half mile.

Bus routes 38 and 40 offer the most direct access to the district, running along Parkside Avenue. Trolley routes 10 and 15 run nearby, and are the impetus for this study. Route 15 travels along Girard Avenue at the southern end of the study area, and Route 10 follows Lancaster Avenue about a half mile south of the district en route to Center City.

Yet, while numerous transit routes travel through or near the district, stakeholders have articulated shortcomings about existing service. The Philadelphia City Planning Commission, for example, wrote in their *West Park District Plan*: “Cultural attractions in the Centennial District including the Mann Center, the Please Touch Museum, and the Philadelphia Zoo do not have direct transit links to suburban destinations or Center City and rely heavily on surface parking, which sometimes has adverse traffic impacts on local

residential streets.”⁶

The district’s pedestrian network also presents challenges to visitors using transit. Parkside, Girard, and Belmont Avenues are all on Philadelphia’s High Injury Network, corridors with highest rates of fatalities and severe injuries per mile, and can be unsafe for pedestrians. Likewise, the occasional lack of sidewalks limit bus stop locations, such as on East and West Memorial Hall Drives, where Route 38 must make a ½-mile loop to serve the PTM.

⁶ Philadelphia City Planning Commission, *West Park District Plan*, 2012.

Centennial District

Trolley Service Concept Evaluation

Existing Conditions

Trolley Route 10: 13th-Market to Overbrook



Figure 13: Trolley Route 10 map
Source: SEPTA, 2019

ROUTE DESCRIPTION

Passengers use Route 10 to travel between Center City and Overbrook, in West Philadelphia. Route 10 runs underground, making subway stops in the trolley tunnel, between 13th and 36th Streets. From there, Route 10 runs above ground in mixed traffic to 63rd Street & Malvern Avenue. Free transfers are available to the Broad Street Line at 15th Street Station, and to the Market Frankford Line at 13th, 15th, and 30th Street stations.

SERVICE LEVELS

	PERIOD	FREQUENCY (MINS.)
WEEKDAY	Peak (AM PM)	5 5
	Base	10
	Early Evening	12
	Late Night	30
SATURDAY	Peak (AM PM)	20 15
	Base	15
	Early Evening	20
	Late Night	30
SUNDAY	Peak (AM PM)	25 20
	Base	20
	Early Evening	20
	Late Night	30

Table 1: Route 10 service levels

OPERATING STATISTICS

One-way Route Miles	5.9
Average Daily Weekday Ridership	13,645
On-time Performance	76%
Weekday Operating Hours	24

Table 2: Route 10 operating statistics

Existing Conditions

Centennial District Trolley Service Concept Evaluation

Trolley Route 15: 63rd-Girard to Richmond-Westmoreland



Figure 14: Trolley Route 15 map
Source: SEPTA, 2019

ROUTE DESCRIPTION

Trolley Route 15 travels crosstown, mostly along Girard Avenue, from Haddington in the west to Port Richmond in the east. It is the only SEPTA city trolley line that does not use the trolley tunnel to access Center City, though it does cross the Broad Street Line and Market-Frankford Line, where passengers may transfer for a \$1 fee.

Route 15 runs less frequently than other trolley routes, but runs 24 hours-a-day. Route 15 was a trolley line until 1992, when its trolleys were replaced by buses, but was restored as a trolley route in 2005 using a dedicated fleet of restored historic trolley cars.

SERVICE LEVELS

	PERIOD	FREQUENCY (MINS.)
WEEKDAY	Peak (AM PM)	9 10
	Base	15
	Early Evening	15
	Late Night	30
SATURDAY	Peak (AM PM)	20 15
	Base	15
	Early Evening	20
	Late Night	30
SUNDAY	Peak (AM PM)	20 15
	Base	15
	Early Evening	20
	Late Night	30

Table 3: Route 15 service levels

OPERATING STATISTICS

One-way Route Miles	9.4
Average Daily Weekday Ridership	8,120
On-time Performance	69%
Weekday Operating Hours	24

Table 4: Route 15 operating statistics

Since 2012, the route east of Front Street has been served by buses due to PennDOT's 1-95 reconstruction.

Centennial District

Trolley Service Concept Evaluation

Existing Conditions

Bus Route 31: City Hall to 76th-City

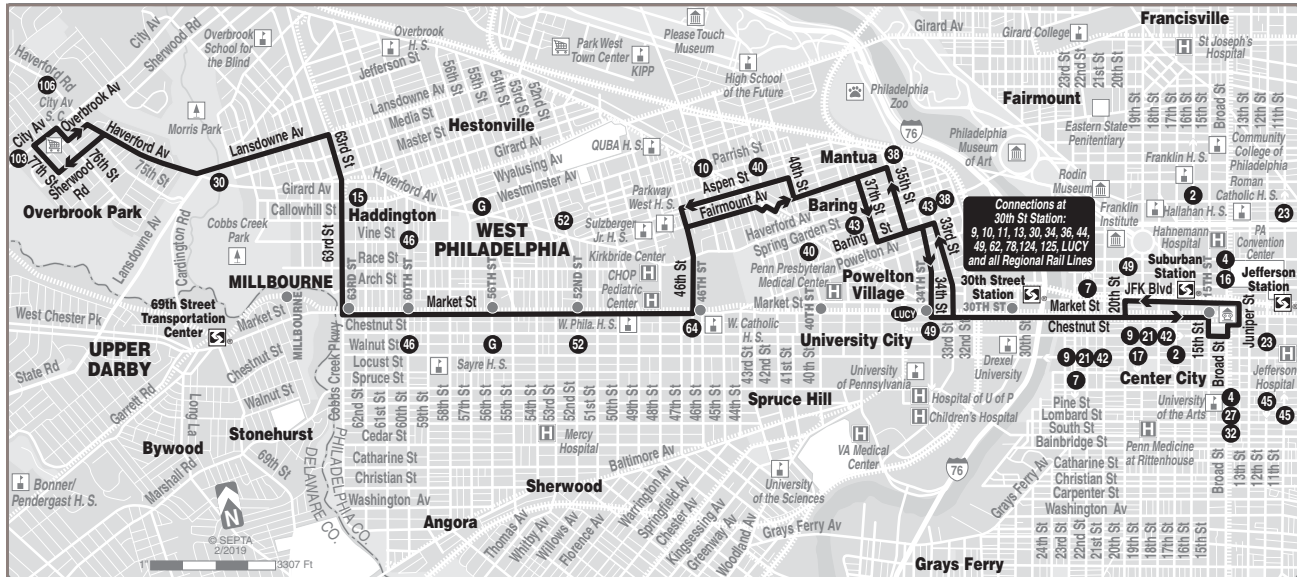


Figure 15: Bus Route 31 map

Source: SEPTA, 2019

ROUTE DESCRIPTION

Bus Route 31 travels from City Hall to the Overbrook Park enclave in West Philadelphia, providing local service along the Market-Frankford Line for much of its length. Along the way, the route makes two main deviations, one to serve Mantua and Mill Creek, and the other along 63rd Street in Haddonfield. The 2018 *Philadelphia Bus Network Choices Report* by Jarrett Walker + Associates highlights Route 31 as an example of complex bus routing through Mantua, a condition that minimizes walking distances to bus stops for Mantua residents, but maximizes waiting times for all Route 31 riders.

SERVICE LEVELS

	PERIOD	FREQUENCY (MINS.)
WEEKDAY	Peak (AM PM)	15 17
	Base	25
	Early Evening	30
	Late Night	60
SATURDAY	Peak (AM PM)	60 30
	Base	30
	Early Evening	60
	Late Night	60
SUNDAY	Peak (AM PM)	60 45
	Base	45
	Early Evening	60
	Late Night	60

Table 5: Route 31 service levels

OPERATING STATISTICS

One-way Route Miles	9.0
Average Daily Weekday Ridership	4,704
On-time Performance	72%
Weekday Operating Hours	5AM–2AM

Table 6: Route 31 operating statistics

Existing Conditions

Centennial District Trolley Service Concept Evaluation

Bus Route 38: 5th-Market to Wissahickon Transportation Center

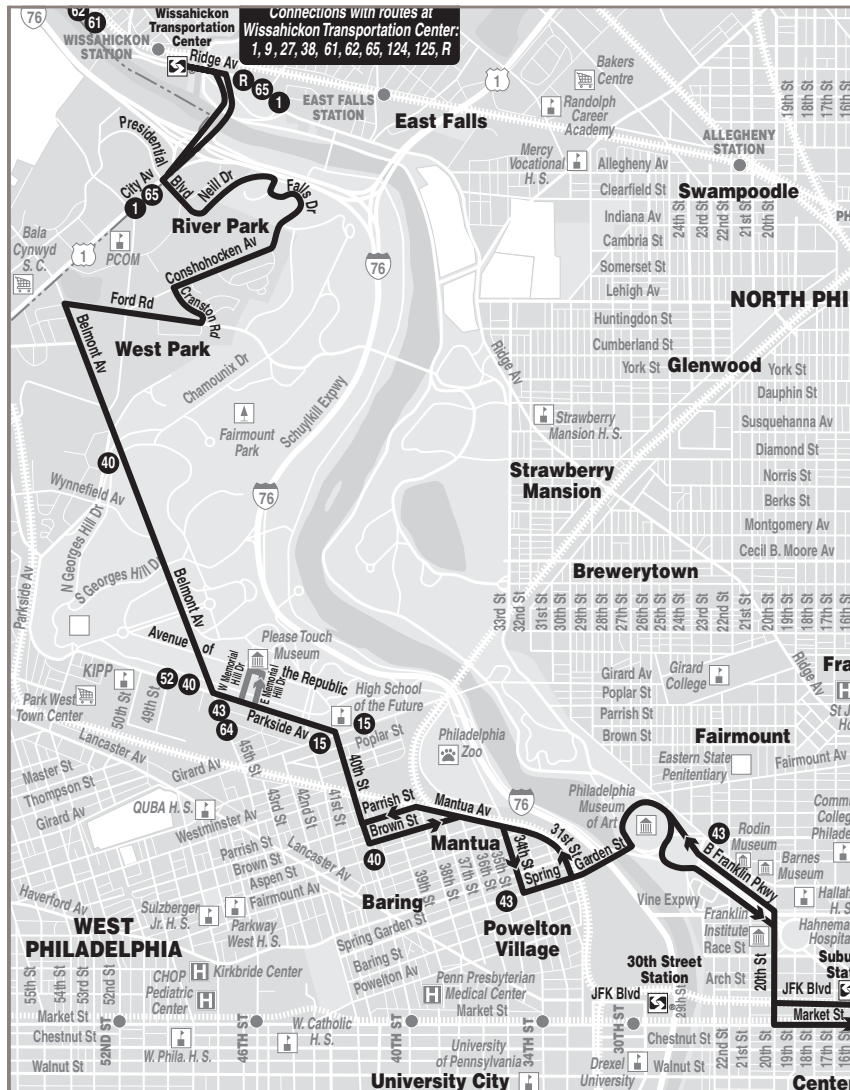


Figure 16: Bus Route 38 map (detail)

Source: SEPTA, 2017

ROUTE DESCRIPTION

Bus Route 38 travels between Wissahickon Transportation Center and 5th and Market Streets. Along the way, it travels through Fairmount Park, including along Parkside Avenue in the Centennial District. Route

38 is known as a tourism-focused bus route, as it reaches attractions such as the Philadelphia Museum of Art and Independence Mall. Ridership data and SEPTA staff guidance suggest, however, that most 38 riders are not tourists. Like Route 31, Route 38 provides

SERVICE LEVELS

	PERIOD	FREQUENCY (MINS.)
WEEKDAY	Peak (AM PM)	16 16
	Base	20
	Early Evening	30
SATURDAY	Peak (AM PM)	40 30
	Base	30
	Early Evening	30
SUNDAY	Peak (AM PM)	45 45
	Base	45
	Early Evening	45
	Late Night	60

Table 7: Route 38 service levels

OPERATING STATISTICS

One-way Route Miles	10.0
Average Daily Weekday Ridership	2,932
On-time Performance	71%
Weekday Operating Hours	5:30 AM – 2 AM

Table 8: Route 38 operating statistics



coverage to a portion of Mantua limiting its potential frequency. In the Centennial District, Route 38 must make a 1/8-mile loop to serve the PTM because there is no direct sidewalk connection between Parkside Avenue and PTM.

Centennial District

Trolley Service Concept Evaluation

Existing Conditions

Bus Route 40: 2nd-Lombard to Conshohocken-Monument

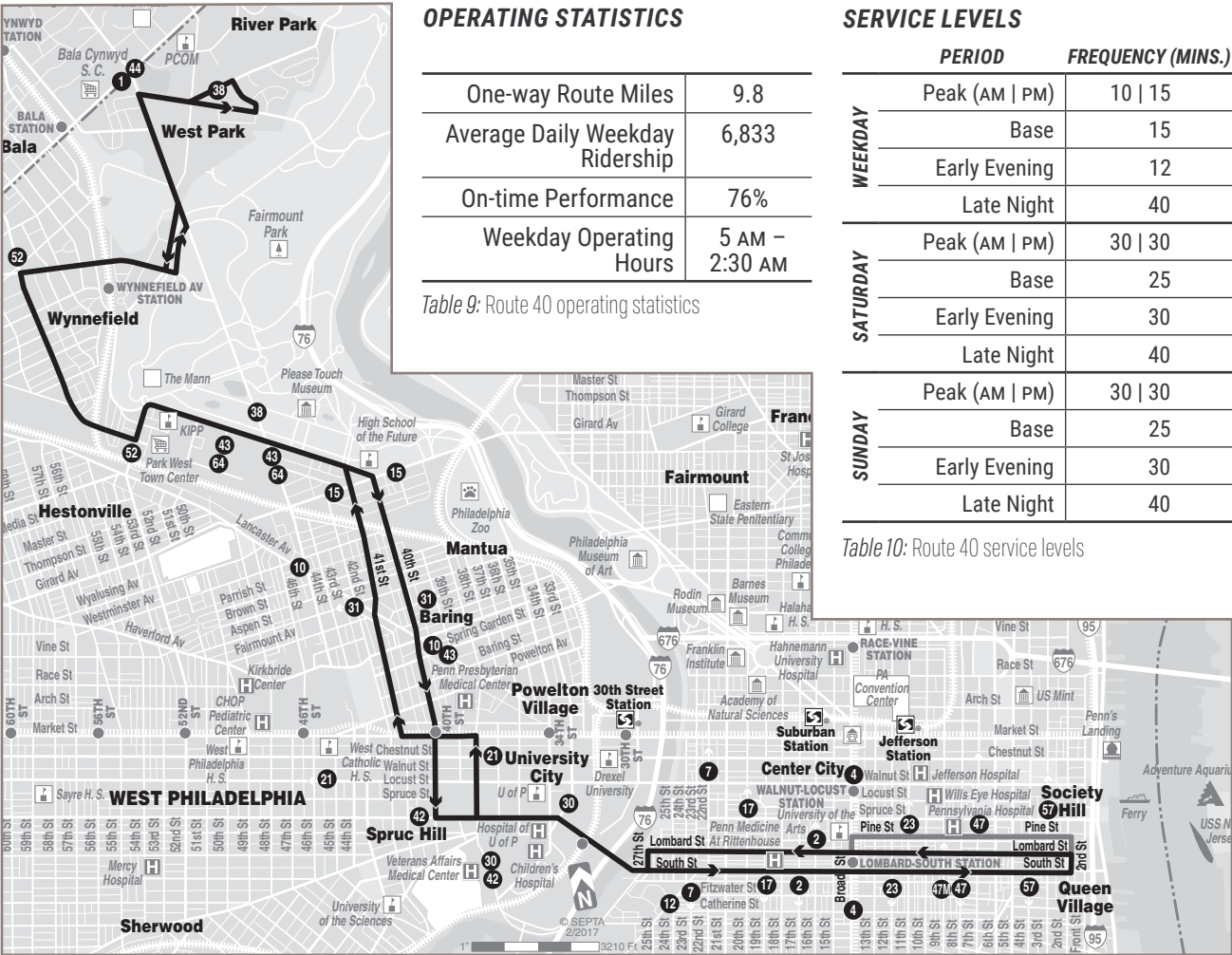


Figure 17: Bus Route 40 map (detail)

Source: SEPTA, 2017

ROUTE DESCRIPTION

Bus Route 40 travels between Society Hill and West Park, with stops along the way in Center City, University City, Mantua, Parkside, and Wynnefield.

Route 40 runs along Parkside Avenue providing direct access to

the edge of Fairmount Park—the core of this project’s study area—but does not enter the park.

Major destinations along the route include the 40th Street Market-Frankford Line station and the University City medical

complex. Similar to Route 38, Route 40 provides access to the Centennial District from Center City and University City, with more frequent service than the 38, and without serving Benjamin Franklin Parkway destinations.

Existing Conditions

Centennial District Trolley Service Concept Evaluation

Bus Route 43: Richmond-Cumberland to 50th-Parkside

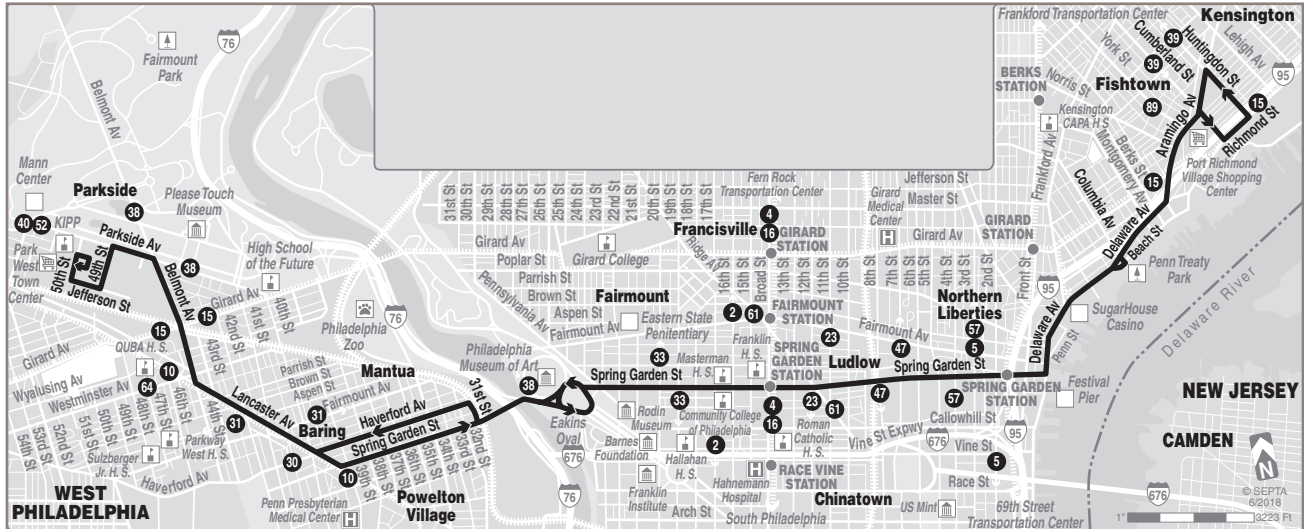


Figure 18: Bus Route 43 map

Source: SEPTA, 2018

ROUTE DESCRIPTION

Passengers use Route 43 to travel between Fishtown/Kensington and the 50th and Parkside Avenue loop at the Park West Town Center. This 7.1-mile route runs along Spring Garden Street and Lancaster, Belmont and Parkside avenues heading west and is in many ways a parallel route to the 15 trolley. Riders can transfer to both the Broad Street and Market-Frankford lines' Spring Garden stations from this route.

SERVICE LEVELS

		FREQUENCY (MINS.)
WEEKDAY	PERIOD	
	Peak (AM PM)	16 16
	Base	20
	Early Evening	30
SATURDAY	Late Night	60
	Peak (AM PM)	40 30
	Base	30
	Early Evening	30
SUNDAY	Late Night	60
	Peak (AM PM)	45 45
	Base	45
	Early Evening	45
	Late Night	60

Table 11: Route 43 service levels

OPERATING STATISTICS

One-way Route Miles	10.0
Average Daily Weekday Ridership	2,932
On-time Performance	71%
Weekday Operating Hours	5:30 AM – 2 AM

Table 12: Route 43 operating statistics

Bus Route 52: 49th-Woodland to 54th-City or 50th-Parkside

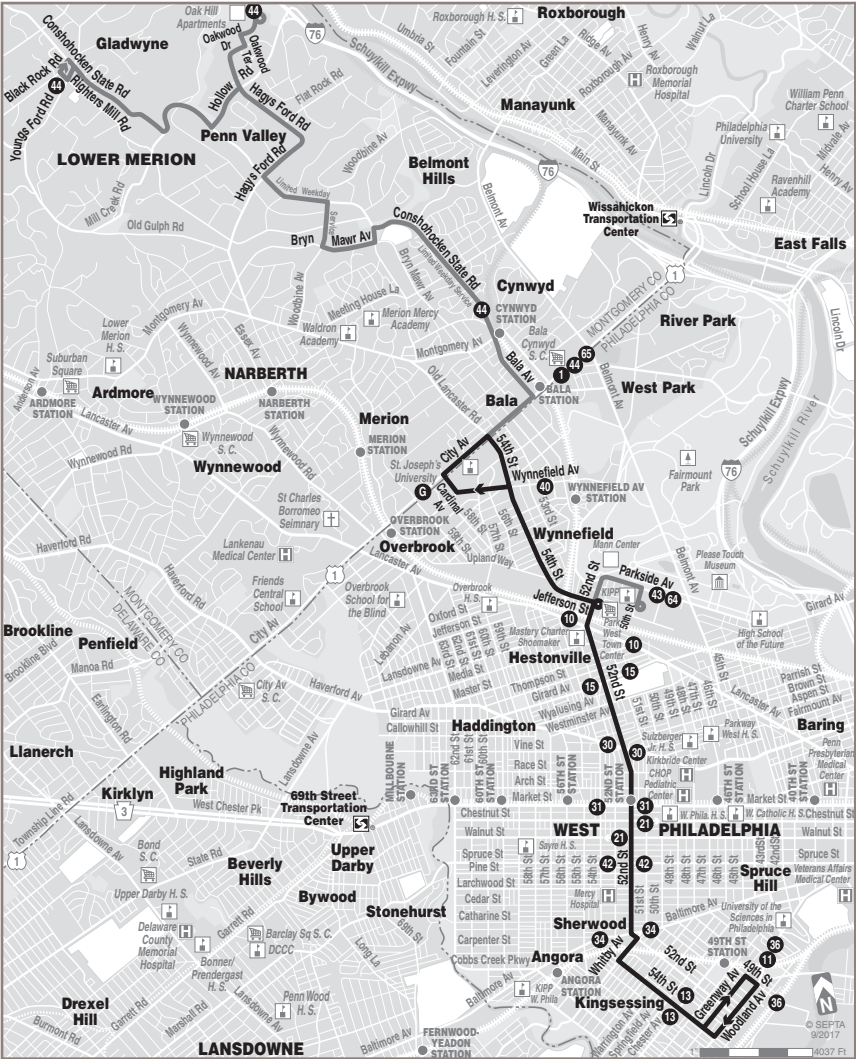


Figure 19: Bus Route 52 map
Source: SEPTA, 2017

ROUTE DESCRIPTION

Route 52 is a relatively short north/south route in West Philadelphia, running between 49th-Woodland in Kingessing to 54th-City Avenue. It runs primarily along 52nd and 54th streets and is a 24-hour a day service.

This is the most frequent route in the study area, feeding the busy 52nd Street corridor and the 52nd Street Market-Frankford Line station. Route 52 has two alternate service patterns, one serving Lower Merion, and the

SERVICE LEVELS

		FREQUENCY (MINS.)
WEEKDAY	Peak (AM PM)	4 4
	Base	8
	Early Evening	12
	Late Night	20
SATURDAY	Peak (AM PM)	15 8
	Base	8
	Early Evening	15
	Late Night	20
SUNDAY	Peak (AM PM)	30 12
	Base	12
	Early Evening	15
	Late Night	20

Table 13: Route 52 service levels

OPERATING STATISTICS

One-way Route Miles	5.8
Average Daily Weekday Ridership	14,900
On-time Performance	73%
Operating Hours	24

Table 14: Route 52 operating statistics

other shortening the route by ending at the Parkside Loop in West Parkside.

Existing Conditions

Centennial District Trolley Service Concept Evaluation

Bus Route 64: Richmond-Cumberland to 50th-Parkside



SERVICE LEVELS

	PERIOD	FREQUENCY (MINS.)
WEEKDAY	Peak (AM PM)	10 15
	Base	20
	Early Evening	20
	Late Night	45
SATURDAY	Peak (AM PM)	30 30
	Base	30
	Early Evening	30
	Late Night	45
SUNDAY	Peak (AM PM)	30 30
	Base	30
	Early Evening	30
	Late Night	N/A

Table 15: Route 64 service levels

OPERATING STATISTICS

One-way Route Miles	9.0
Average Daily Weekday Ridership	5,845
On-time Performance	78%
Operating Hours	6 AM - 12:30 AM

Table 16: Route 64 operating statistics



Figure 20: Bus Route 64 map (detail)

Source: SEPTA, 2019

ROUTE DESCRIPTION

Passengers use Route 64 to travel from 50th and Parkside Avenue heading south, then eastbound to Pier 70 in South Philadelphia. This 9-mile route runs south through West Philadelphia before crossing over the Gray's Ferry

Bridge to Washington Avenue, ending at the Pier 70 shopping center on Columbus Boulevard. This route serves South and West Philadelphia and offers a one-seat ride to the Centennial District. However, since the

route ends at the Park West Town Center, access to Fairmount Park requires a transfer or at least a ½ mile walk, depending on the destination.

Regional Rail: Cynwyd Line

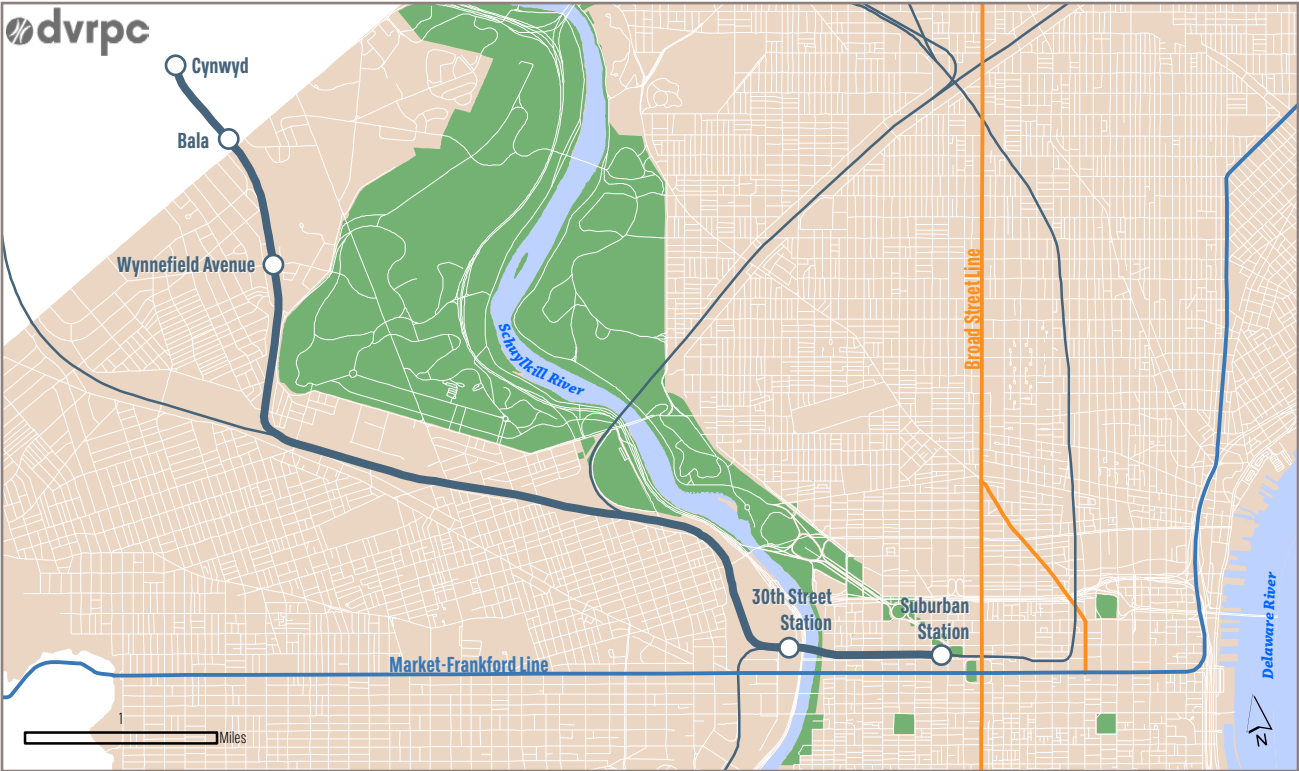


Figure 21: Regional Rail: Cynwyd Line map

ROUTE DESCRIPTION

Passengers can use the Cynwyd Regional Rail line on weekdays as it runs from Suburban Station to the Cynwyd station in Bala Cynwyd, PA, located at Conshohocken State Road and Bala Avenue. The Cynwyd Line runs through the study area but does not serve it directly. This 6.1-mile route is the shortest and has the lowest ridership of all SEPTA regional rail lines. Only 10 or 11 trains run per day, depending on the direction. Cynwyd Line trains stop at Cynwyd, Bala, Wynnefield Avenue, 30th Street, and Suburban stations.

SERVICE LEVELS

	FREQUENCY (MINS.)	
	PERIOD	
WEEKDAY	Peak (AM PM)	40 34
	Base	1 trip
	Early Evening	56
	Late Night	N/A
SATURDAY	No Service	
SUNDAY	No Service	

Table 17: Cynwyd Line service levels

OPERATING STATISTICS

One-way Route Miles	6.1
Average Daily Weekday Ridership	623
On-time Performance	92%
Weekday Operating Hours	6:29 AM - 8:19 PM

Table 18: Cynwyd Line operating statistics

Existing Conditions

Centennial District Trolley Service Concept Evaluation

PHLASH

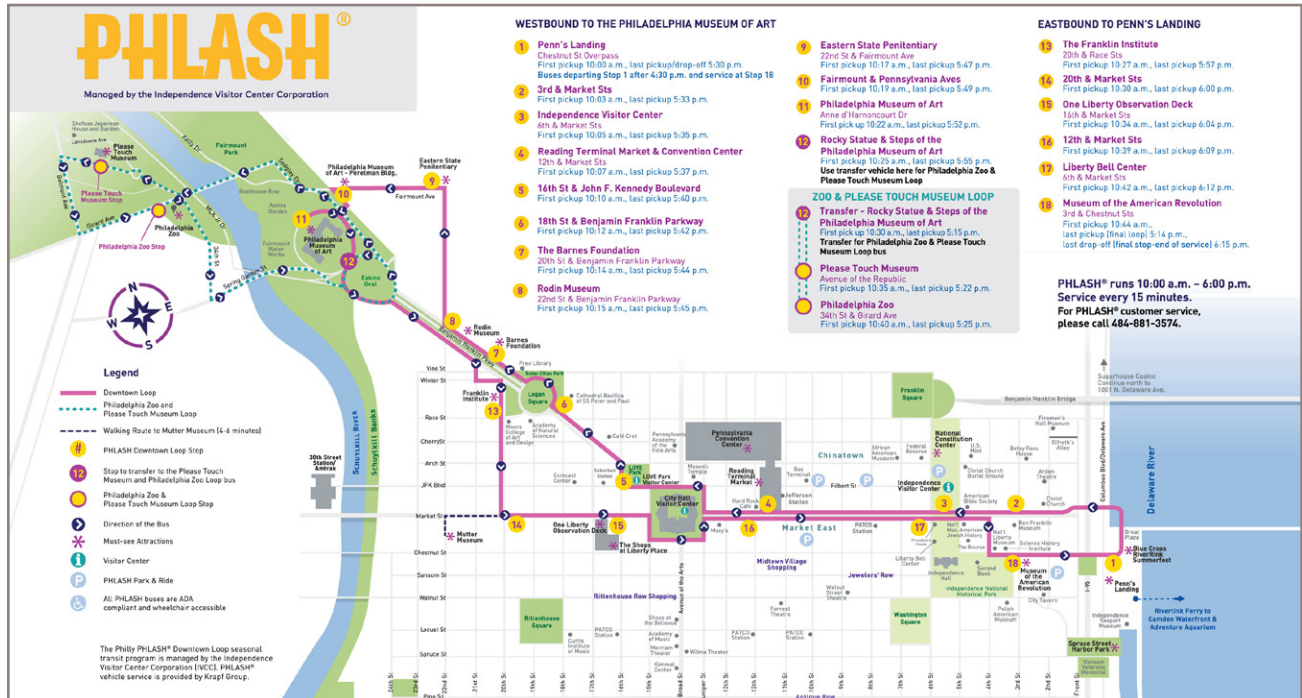


Figure 22: PHLASH map
Source: IVCC, 2019

ROUTE DESCRIPTION

PHLASH, a public transit bus route that provides service to Philadelphia's main tourist attractions, debuted in 1994 and is currently operated by the Independence Visitor Center Corporation (IVCC) in partnership with SEPTA. The route's main loop begins at Penn's Landing and ends at the Philadelphia Museum of Art (PMA), stopping at popular tourist destinations along the way. To access the Please Touch Museum (PTM) and the Zoo, riders must transfer at PMA to a separate loop.

Service is offered seasonally, from May to November, with 15-minute frequency. Ridership is typically higher at Downtown Loop stops, with 30,000–45,000 riders at major stops in Center City, compared to 7,000–10,000 using Zoo/PTM Loop stops annually in 2016. Individual rides cost \$2, \$5 for an all-day pass, or \$8 for a two-day pass. SEPTA pass and Key holders ride for free. PHLASH information is available in-person or online through IVCC and Visit Philadelphia. SEPTA publishes minimal information about PHLASH on its website.

PHLASH is funded through an Act 89 grant. That grant requires a 15 percent match supplied by several tourist destinations and from the City of Philadelphia. Operations are contracted to Krapf's Coaches, who run buses wrapped with the purple and yellow PHLASH brand. Five buses operate on the Downtown Loop, and two on the Zoo/PTM Loop. Many stops have on-street route signage and maps. IVCC continues to seek ways to improve its wayfinding and customer experience, including conducting a 2017 study, the *PHLASH Wayfinding Audit*.

Centennial District

Trolley Service Concept Evaluation

Existing Conditions

Mann Center Bus Loop

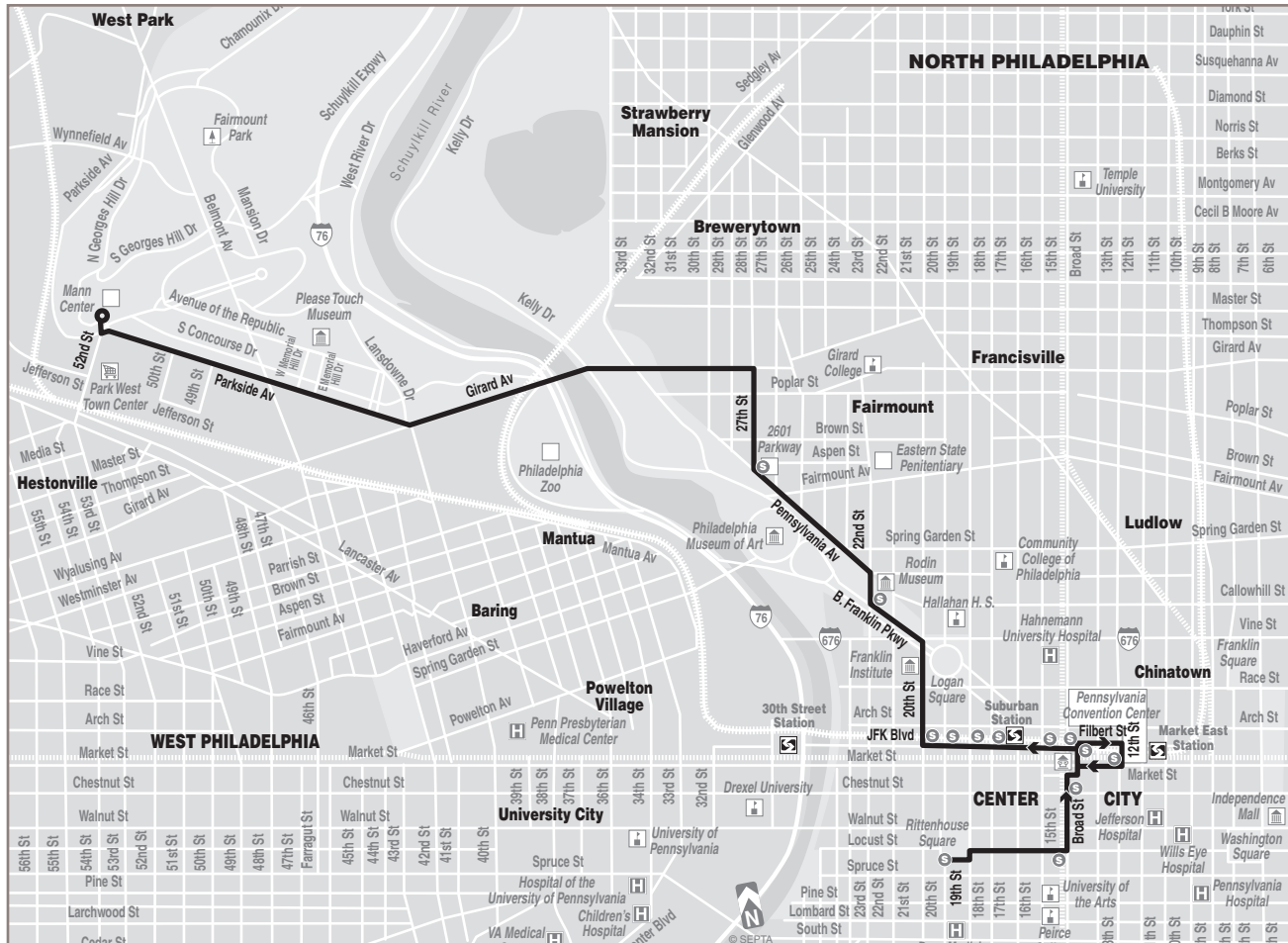


Figure 23: Mann Center Bus Loop map

Source: SEPTA, 2012

ROUTE DESCRIPTION

For travel to the Mann Center, SEPTA funds and operates the Mann Center Bus Loop on event days. This service runs once per evening, departing an hour and 10 minutes before an event start time, with arrival 20 minutes prior to the show. A return trip leaves the Mann Center 30

minutes after the event concludes, following the same route through Center City in reverse.

SEPTA's webpage for the Mann Loop lists eight to twelve scheduled stops, with the stop program determined by the event start time—a potential source of confusion for riders. All stops are in Center City. The service is

provided by a standard SEPTA bus and costs a regular fare which can be paid via any of the regular payment methods (cash, SEPTA Key, a token, or the Independence Pass). Information about this service is provided on both the Mann Center and SEPTA's websites.

Existing Public Transit Infrastructure

A potential trolley service extension to the Centennial District could benefit from existing transit infrastructure. SEPTA maintains trolley tracks and overhead wire for its active routes in the study area, routes 10 and 15. SEPTA also maintains track and wire for less frequently used segments.

Most relevant to this project is a portion of track beginning at a loop at 40th Street, Parkside, and Girard Avenues, then running south along 40th, 41st, and Ogden Streets until it meets Route 10 on Lancaster Avenue. These tracks allow SEPTA to circulate its trolleys between Route 15 and the Subway-Surface

routes in the event of a breakdown or other disruption.

South of Lancaster Avenue, SEPTA uses tracks on 40th, 41st, and 38th Streets to provide diversion service when the trolley tunnel is blocked or closed for maintenance.

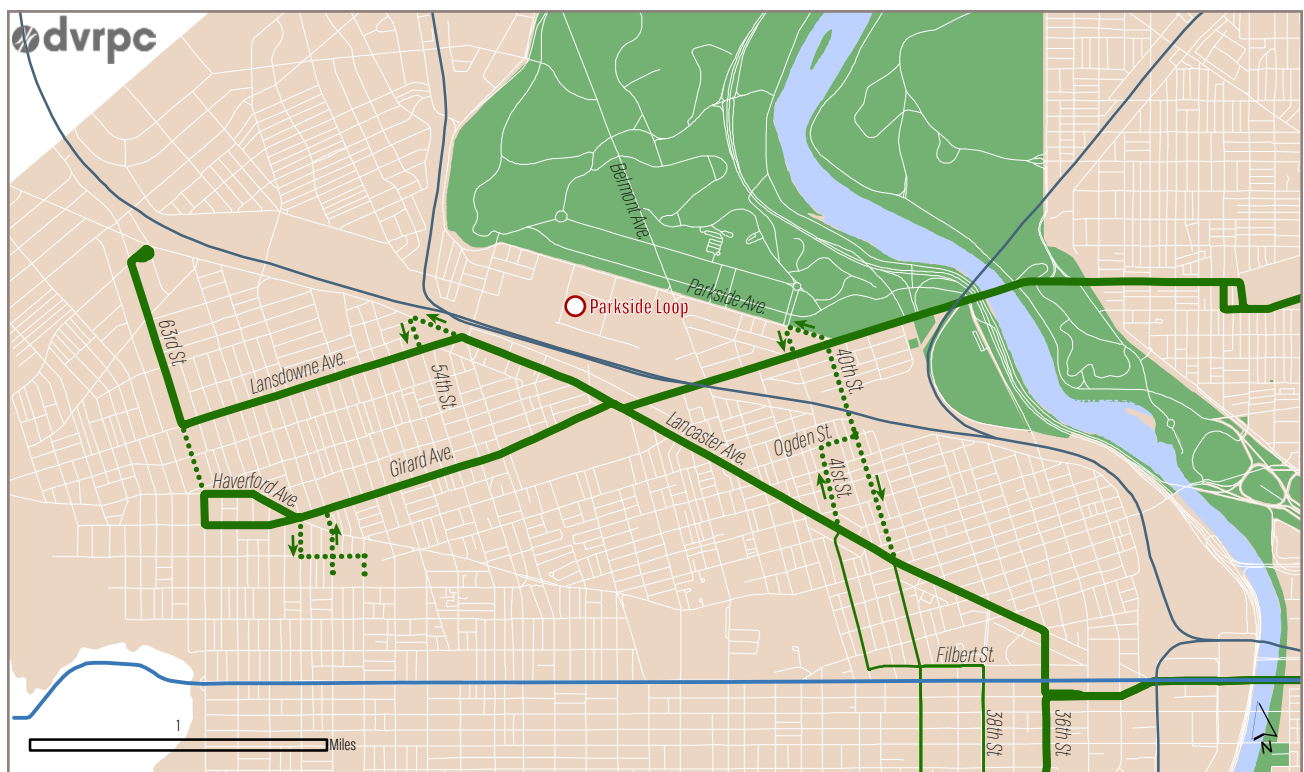
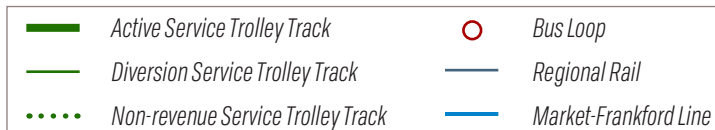


Figure 24: Existing public transit infrastructure map



Centennial District

Trolley Service Concept Evaluation

In the immediate study area, Parkside Loop is the terminus for bus routes 43 and 64, and an alternative pattern of Route 52. The loop is an off-street facility on SEPTA property with a sheltered passenger waiting area, and a building with restrooms for bus operators. The dimensions of Parkside Loop are roughly compatible with those of existing trolley loops in SEPTA's network, meaning that if track were laid within the loop, there would likely be enough space for existing trolleys to enter and turn back safely. With vehicle dimensions for modern trolleys still unknown, it is not possible to determine whether or not Parkside Loop would be viable for modern trolleys.

Other notable transit stops in the district include:

- > A Route 52 stop on private property within the ParkWest Town Center's parking lot, and
- > A Route 38 stop on Avenue of the Republic, in front of the Please Touch Museum. Route 38 makes a loop to this location from Parkside Avenue because there are no sidewalks on East or West Memorial Drive that would connect the museum to Parkside Avenue.

Existing Conditions



Figure 25: Parkside Loop



Figure 26: Route 52 stop in ParkWest Town Center



Figure 27: Missing sidewalk connection between Parkside Avenue and PTM

Ridership Forecasting

To better understand the feasibility of new trolley service in a Trolley Modernization context, the project team performed ridership forecasts of two potential trolley routes. DVRPC's regional travel demand model can estimate changes in stop-level transit ridership based on proposed changes to the region's transportation network.

The model is useful to estimate a Centennial District trolley extension's ridership potential, but with some important qualifications. First, the model works best when estimating transit service on a typical weekday. This project focuses on a district with several recreational and tourist destinations. The modeled results may not offer a full picture of recreational trips, especially those made on weekends.

Second, this project covers a relatively small geographic area—about five census tracts—with minimal expected new development. Because the Centennial District is already served by several bus routes, the model results identified few *new* riders, rather, the model mainly estimated that riders of existing routes would modify their trips if a Centennial District trolley extension existed.

ROUTE CONCEPT DEVELOPMENT

At this project's kickoff, the steering committee discussed their priorities for modeling a trolley service extension to the Centennial District. Specifically, the committee was interested in modeling routes that would minimize capital costs by taking advantage of existing trolley infrastructure, and/or routes that could draw riders making both recreational trips and commute-based trips.

The steering committee expressed a preference for comparing ridership on two types of routes: one that would take advantage of the trolley tunnel to provide direct subway-surface service to Center City, and another that would branch off of the existing Route 15 along Girard Avenue.

The project team presented two draft route patterns based on feedback from the kickoff meeting. The steering committee discussed these draft alternatives, selected station stops, and modified each route's alignment as necessary. For modeling purposes, the steering committee agreed that one-third of Route 10 and 15's respective scheduled trips would branch off to their respective route pattern alternatives.



Figure 28: Route selection workshop

Centennial District

Trolley Service Concept Evaluation

Analysis

PATTERN A: TROLLEY TUNNEL

This alternative pattern of Route 10 would begin in the Center City trolley tunnel, and branch off at 40th/41st Streets & Lancaster Avenue, continuing north to 40th Street & Parkside Avenue. The pattern would follow Parkside Avenue to 52nd Street, then return to the Route 10 alignment at 52nd Street and Lancaster Avenue, ending at 63rd Street & Malvern Avenue.

This route would split Route 10 between 40th and 52nd Streets. These routes' shared alignment would receive more frequent service, while their split alignments would offer more coverage.



Figure 29: Pattern A: Trolley Tunnel

PATTERN B: GIRARD AVENUE

This route would be a spur of Route 15, beginning at the existing route's loop terminus at Frankford & Delaware Avenues. Moving west, the route would branch off at 40th Street & Girard Avenue onto Parkside Avenue, then continue to 50th Street and Parkside Loop.

This pattern would enable changes to Route 15 service patterns. By terminating at Parkside Loop, it would enable other Route 15 trips to terminate at 63rd Street and Girard Avenue. This would create a "trunk line" on Girard Avenue between Frankford Avenue and 40th Street, with less frequent spurs.



Figure 30: Pattern B: Girard Avenue

RIDERSHIP FORECAST RESULTS

These two route alternatives were coded into DVRPC's regional travel demand model to estimate changes in route-wide ridership for the two trolley routes and six nearby bus routes. The results of each scenario are presented below with the ridership estimates for each modified route highlighted. As route-wide ridership estimates, these results include both existing trolley patterns and route modifications. For instance, in Table 20, below, the 14,444 riders estimated to ride Route 10, include riders using the existing Route 10's Lancaster Avenue alignment, and the one-third of trips routed to Parkside Avenue.

EXISTING CONDITIONS MODEL

ROUTE	RIDERSHIP ESTIMATE
31	7,948
38	7,783
40	10,145
43	2,795
52	8,840
64	11,216
10	13,626
15	7,994
TOTAL:	70,346

Table 19: Ridership estimates, existing conditions model

PATTERN A: TROLLEY TUNNEL

ROUTE	RIDERSHIP ESTIMATE	% CHANGE
31	7,996	+ 1 %
38	7,629	- 2 %
40	9,917	- 2 %
43	2,779	- 1 %
52	8,902	+ 1 %
64	11,206	0 %
10	14,444	+ 6 %
15	7,924	- 1 %
TOTAL:	70,796	+ 0.6 %

Table 20: Ridership estimates, pattern A

PATTERN B: GIRARD AVENUE

ROUTE	RIDERSHIP ESTIMATE	% CHANGE
31	7,950	0%
38	7,818	0%
40	10,716	+ 6%
43	2,778	- 1%
52	8,838	0%
64	11,171	0%
10	13,721	+ 1%
15	7,661	- 4%
TOTAL:	70,654	+ 0.4%

Table 21: Ridership estimates, pattern B

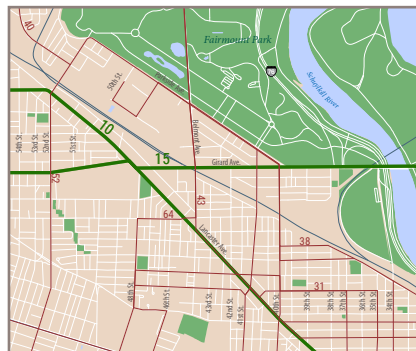


Figure 31: Existing transit routes



Figure 32: Pattern A: Trolley Tunnel

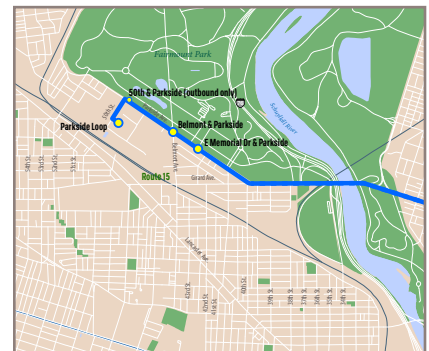


Figure 33: Pattern B: Girard Avenue

Centennial District

Trolley Service Concept Evaluation

Analysis

NEW RIDERSHIP POTENTIAL

Our model identified minimal potential to attract new SEPTA riders under our build scenarios. Under the two build scenarios, SEPTA riders currently using existing routes would be expected to shift their trips to either another existing bus or trolley route, or to one of the build scenario routes. The “% Change” totals in each scenario speak to this minimal new ridership creation.

This result is consistent with our expectations based on existing conditions. The Centennial District is already served by several bus and trolley routes, and the ridership forecasts simply showed a relatively small portion of SEPTA customers (up to 6 percent on a given route) shifting their trips to other transit routes.

In addition to existing transit coverage, ridership growth potential is constrained by the Centennial District’s development conditions. The district is currently home to about 5,300 residents. At this time, there are no major planned new residential developments or commercial developments that would bring enough new transit riders to the district to alter the ridership forecasts. A large portion of the district is parkland, which is not available for new homes or businesses.

ROUTE PATTERN COMPARISON

In *Pattern A*, some existing SEPTA riders appeared to shift to the modified Trolley Route 10 from other routes. We estimated ridership growth by 818 daily passengers, or about 6 percent. The ridership estimates for routes 38 and 40, each of which offers a one-seat ride to Center City from the Centennial District, decreased by approximately 2 percent each. We interpret this shift in riders as a result of more direct access to Center City provided by our modified Trolley Route 10 compared to existing bus routes on Parkside Avenue.

In *Pattern B*, on the other hand, we found our route modifications to Route 15 resulted in ridership loss for that route, with apparent ridership shifts towards Bus Route 40 and the existing Route 10. We believe this to be the result of lower frequency on Route 15 west of 40th Street, as a third of trips were diverted to serve Parkside Avenue.

One consistency across both modeled route patterns was an apparent desire for a direct route from Parkside Avenue to Center City. This is apparent in the shift of riders to *Pattern A*, which would provide subway service to Center City. Likewise, the ridership shift to Bus Route 40 in the *Pattern B* build scenario suggests a demand for that route’s connection to the Market-

Frankford Line, and its direct route to southern Center City.

Taken together, these results suggest our build scenarios would not be expected to attract new riders on a typical weekday. Rather, in each case, growth or loss in ridership for new-build trolley routes would come at the expense or benefit of existing SEPTA routes.

MARGIN OF ERROR

Ridership in the existing conditions model for this project was calibrated to within ± 10 percent. The estimated ridership changes were, thus, within the model’s margin of error, meaning it is not advisable to infer major conclusions from the ridership change of any individual route.

The total change in ridership of less than 1 percent for either build scenario, however, is consistent with the factors present in the study area: minimal new residential or commercial development, and several existing transit options.

Analysis

Centennial District Trolley Service Concept Evaluation

UNIT COSTS

ITEM	COST ESTIMATE RANGE
Embedded Track (per mile)	\$ 8,000,000 – \$ 9,000,000
Curb Extension Station	\$ 200,000 – \$ 250,000
Station with Bicycle Lane	\$ 250,000 – \$ 300,000

Table 22: Unit costs

Notes:

Cost estimates include soft costs, such as design and contingency costs.

"Embedded track" estimate is for a single-direction track mile.

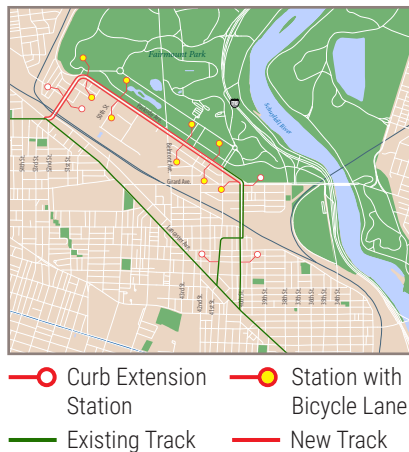
Station cost estimates are for single-direction platform and associated station elements.

Additional capital costs, such as overhead wire and power infrastructure, are excluded from these estimates.

PATTERN A COST ESTIMATES

ITEM (AMOUNT)	COST ESTIMATE RANGE
Embedded Track (2.93 mi.)	\$ 23,464,000 – \$ 26,397,000
Curb Extension Stations (5)	\$ 1,000,000 – \$ 1,250,000
Station with Bicycle Lane (9)	\$ 2,250,000 – \$ 2,700,000
Total:	\$ 26,714,000 – \$ 30,347,000

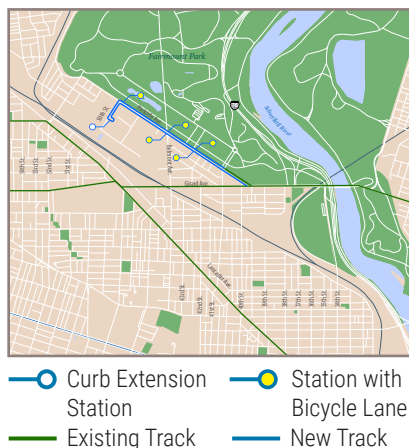
Table 23: Pattern A cost estimates



PATTERN B COST ESTIMATES

ITEM (AMOUNT)	COST ESTIMATE RANGE
Embedded Track (2.02 mi.)	\$ 16,160,000 – \$ 18,180,000
Curb Extension Stations (1)	\$ 200,000 – \$ 250,000
Station with Bicycle Lane (7)	\$ 1,750,000 – \$ 2,100,000
Total:	\$ 18,110,000 – \$ 20,530,000

Table 24: Pattern B cost estimates



Capital Costs

This project specifically investigates whether trolley service to the Centennial District is feasible in the context of Trolley Modernization. One feasibility component is the capital cost of modern, ADA-compliant trolley service.

New trolleys will be required to meet ADA standards, which will be accomplished not only by purchasing low-floor, multi-door vehicles, but also by constructing in-street stations compatible with new vehicles. DVRPC's *Modern Trolley Station Design Guide* (2017) presented conceptual designs for stations that are compatible with modern trolleys, incorporate streetscape elements (such as bicycle lanes), and are ADA compliant.

For this analysis, SEPTA provided order-of-magnitude cost estimates for modern trolley stations and for in-street trolley track (see Table 22). The project team applied these cost estimates to the two proposed route patterns (see Table 23 and Table 24).

Additional capital costs, such as overhead wire and other power infrastructure, are not included in this analysis. These costs do not assume a need to purchase any additional trolley vehicles beyond those expected for modernizing routes 10 and 15.

Centennial District

Trolley Service Concept Evaluation

Analysis

The Centennial District in SEPTA's Citywide Network

SEPTA is preparing to reevaluate its bus network in the face of declining ridership. In 2018, the agency published the *Philadelphia Bus Network Choices Report*, which examined the existing network, and laid out factors for SEPTA to consider as it redesigns routes.

The bus network reevaluation will be a multiyear, public process, meaning the alignments and frequency of routes in Philadelphia will be unknown for some time. In anticipation of this process, however, DVRPC has worked with SEPTA to develop a set of guiding principles for planning studies with impacts on the bus network, such as this one. These selected principles are not SEPTA policy, rather, they reflect industry best practices that will certainly inform SEPTA's analysis as it pursues "more service without more money" for its bus network. The DVRPC project team has used them to guide our analysis of the routes in the study area.

Route	Duplication	Out-of-City	Ridership	Coverage
10			100%	
15			100%	
31	70%		10%	20%
38	50%		10%	40%
40	10%		30%	60%
43			80%	20%
52		20%	80%	
64			100%	

Table 25: Service span split

Source: SEPTA, Jarrett Walker + Associates, 2018

Service Division Categories:

Duplication: The percentage of a route's service hours during which it runs on the same street as, or very close to, another route.

Out-of-City: The percentage of a route's service hours during which it runs outside of Philadelphia city limits.

Ridership: The percentage of a route's service hours during which its primary function is to maximize the number of riders who use the route.

Coverage: The percentage of a route's service hours during which its primary function is to reach a wider geographic area.

MINIMIZE MULTIPLE ROUTES SERVING THE SAME CORRIDOR.

Some bus routes in SEPTA's system duplicate the service of another route. An efficient and effective bus and trolley network would reduce service duplication, allowing SEPTA to reallocate vehicles from duplicative routes, providing more frequent service throughout the rest of the network.

Duplicative service is sometimes the result of requests to SEPTA to offer convenient service, such as one-seat rides, for a particular group of SEPTA customers. These requests often result in either single-route or limited-scope analyses; rarely are service patterns examined holistically. Other duplicative routes may have a historical basis, such as a one-time trolley route, in turn converted to a bus route, that follows the same route in spite of shifts in residents or jobs.

There are several service duplications in the study area, including routes 38 and 40 on Parkside Avenue and 40th/41st Streets, and routes 38 and 31 through Mantua. Specifically, the *Choices Report* concludes that approximately 70 percent of Route 31, 50 percent of Route 38, and 10 percent of Route 40's service hours are duplicative of other routes (see Table 25).

At this time, it is not possible to know whether either of the two trolley service patterns modeled for this study would duplicate any redesigned bus routes. If a bus route were to serve Parkside Avenue and continue towards City Avenue, as routes 38 and 40 do today, however, some service duplication would be likely.

ASSUME TRANSFERS WILL BE FREE OR VERY LOW COST FOR CUSTOMERS.

Removing SEPTA's current \$1 transfer penalty would reduce the need for duplicative routes by encouraging riders to transfer to a crossing route. In order to make transfers an effective part of a bus network, each crossing route must run frequently enough to avoid penalizing riders with a long wait time or with a fee.

Many existing routes through the Centennial District are aligned to minimize transfers, including routes 31, 38, and (to a lesser extent) 40. Route 52, on the other hand, is an example of a route laid out to encourage transfers because it is short, service is frequent, and it makes a connection to the Market-Frankford Line.

As the bus network reevaluation progresses, we can assume that SEPTA's network will be designed with an emphasis on relatively straight routes that meet at favorable transfer locations. The two trolley route patterns this project investigates would do the opposite: each splitting from a linear route with high-frequency potential to serve specific destinations.

SIMPLIFY ROUTING, TURN-AROUND LOCATIONS, AND LAYOVERS, FOR BOTH CUSTOMERS AND OPERATORS.

Simplifying routes into straight lines makes it easier for passengers to remember the route. Co-locating turnarounds and layovers at dedicated transit facilities provides, not only an easier connection between more routes, but can also make waiting for the bus more comfortable for riders and operators through the addition of benches, shelters, and restrooms.

In the study area, Route 31's long diversion through Mantua and Powelton Village is the clearest example of a route with an unhelpfully complex alignment.

The steering committee developed this report's two trolley route patterns because they were charged with finding ways to bring trolley service to destinations where demand is higher during off-peak periods, a goal that lent itself to limited-service route alternatives. Either pattern, however, would complicate its respective route, likely leading to passenger confusion.

Recreational Transit Service: Case Study

Many bus routes serve the Centennial District, but visitors may find their frequencies and hours inconvenient. Transportation between destinations *within* Fairmount Park's 2,052 acres is also limited and may deter visitors from using transit.

As DVRPC and our project partners seek to address this challenge, our methods of analysis are, in some ways, limited. For example, our model estimates travel demand on an average weekday. This means that trips to destinations in our study area with high weekend attendance (i.e., PTM, the Zoo, etc.), or with special events on weekdays (i.e., the Mann Center), are not captured in the ridership forecasts as precisely as commute-oriented trips.

To understand the challenges of serving these destinations, the project team spoke to staff from Forest Park Forever, the nonprofit conservancy that manages Forest Park in St. Louis, Missouri, a 1,371-acre public park, which, like the Centennial District, hosted a world's fair, the 1904 Louisiana Purchase Exposition. Also like Fairmount Park, Forest Park's large size and distance from the central business district (4 miles) make it challenging to maintain and serve with public transit.

St. Louis' transit agency, Metro, operates the Forest Park Trolley with support from Forest Park Forever. The Forest Park Trolley is an example of a service that has succeeded in attracting riders, providing a link from light rail service at the park's perimeter to park institutions, and making connections within the park.

The route's first incarnation, the Forest Park circulator bus, was provided wholly by Metro and was a standard bus indistinguishable from other Metro service. It operated on a limited schedule, 10:00 AM to 5:00 PM, from Memorial Day to Labor Day, and did not tailor service to operating days and hours of the park. In 2010 the service was suspended due to lack of funds and its failure to provide a core service used by commuters or students.

After achieving success with a downtown circulator using a fixed-route, historic trolley, Metro approached Forest Park Forever about reinstituting park service. The new service runs from 9:00 AM to 7:00 PM from mid-April to Labor Day, and Forest Park Forever pays for the costs of the additional service days and hours. The other change was to brand the service. Forest Park Forever paid for bus wraps and promotional materials that clearly delineate the park trolley

from regular Metro service.

The Forest Park Trolley bears some instructive similarities to Philadelphia's PHLASH bus service. Forest Park Forever staff report that the trolley's branding distinguishes the service in a way that helps infrequent transit riders or visitors identify it—a conclusion the project team also heard from IVCC staff regarding PHLASH. Another factor for success in St. Louis was that Forest Park Forever's funding was critical in keeping the service running because its ridership does not compare well with other Metro routes. As of 2013, PHLASH also receives a subsidy through Pennsylvania's current transportation law, Act 89.

One key difference is parking supply in each park. Forest Park Forever staff report that there is not enough free parking near major Forest Park institutions to meet visitors' demand, which pushes some users to the trolley. In the Centennial District, there is ample free street parking, which is rarely full.

This peer practice example suggests that Centennial District institutions can achieve similar benefits as would come from new trolley service, but without many of the costs, simply by supporting and expanding PHLASH service.

Conclusions

Effective transit service is a vital part of the Centennial District's future. The project team was tasked, specifically, with investigating how Trolley Modernization factors into that future.

Based on the trolley route options proposed by the steering committee, we find minimal potential for new riders on a Centennial District trolley, but considerable capital expense (see "Ridership Forecast Results" on page 23 and "Capital Costs" on page 25).

Further, existing transit services meet many of the needs identified as benefits of a Centennial District trolley. PHLASH provides a visitor-focused connection to Center City at minimal capital cost, and the Mann Center shuttle provides special event service on a limited basis.

Existing services are also more cost-effective than the proposed Centennial District trolley. At its current yearly operating expense, about \$1.7 million in fiscal year 2017,⁷ PHLASH could be funded for over a decade before it would cost as much as the \$18–31 million in capital costs needed just to begin service on a Centennial District trolley.

Nevertheless, opportunities exist for improving transit access to the Centennial District. During its upcoming CBNR process, SEPTA will have the chance to improve service for visitors and residents. Our analysis suggests SEPTA should focus on addressing overlapping service through the district, such as the duplicative parts of routes 31, 38, and 40, and replacing it with direct, high-frequency service (see "The Centennial District in SEPTA's Citywide Network" on page 26).

Centennial District institutions and stakeholders can most effectively serve visitors by continuing to support PHLASH service through consistent funding and public realm improvements. These stakeholders can further incentivize PHLASH ridership by not building new free parking along with park improvements.

An improved pedestrian environment in the Centennial District can also improve the passenger experience for SEPTA and PHLASH riders. Most critically, a sidewalk connection along Memorial Drive East and/or West between Parkside Avenue and Avenue of the Republic is needed to provide an ADA-compliant connection between bus service on Parkside Avenue and the Please Touch Museum.

⁷ Independence Visitor Center, Corporation *Annual Financial Statements*, Philadelphia: Independence Visitor Center Corporation, 2017.



Figure 34: East Memorial Drive

Centennial District Trolley Service Concept Evaluation

PUBLICATION NUMBER: 17072

PUBLICATION DATE: October 2019

GEOGRAPHIC AREA COVERED: Philadelphia, Pennsylvania

KEY WORDS: Trolley Modernization, SEPTA, Centennial District, Fairmount Park, Route 10, Route 15

ABSTRACT: SEPTA is preparing to replace its trolley fleet with accessible light rail vehicles. This project investigates a proposal to expand trolley service to the Centennial District, in West Fairmount Park. Using ridership forecasts from DVRPC's regional travel model, we find minimal potential for new weekday riders on a Centennial District trolley, but considerable capital expense compared to bus service. The report also investigates other ways to serve recreational and tourist destinations.

STAFF CONTACT: Logan Axelson
Office of Transit, Bicycle, and Pedestrian Planning
(215) 238-2833
loxelson@dvrpc.org



Delaware Valley Regional Planning Commission
190 N Independence Mall West, 8th Floor
Philadelphia, PA 19106
Phone: (215) 592-1800
Fax: (215) 592-9125
Web: www.dvrpc.org



Delaware Valley Regional Planning Commission
190 N Independence Mall West, 8th Floor
Philadelphia, PA 19106
Phone: (215) 592-1800
Fax: (215) 592-9125
Web: www.dvrpc.org

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